

VARIATION IN LEPIDOPTERA.

BY T. D. A. COCKERELL, Boulder, Colo.

Mr. Gunder's interesting article in the December BULLETIN suggests a few comments. Names exist to facilitate reference to objects which interest us. We name every individual of *Homo sapiens*. In recent years there has been a great development of interest in various aspects of evolution, genetics and geographical distribution, and Lepidoptera are found to be very useful for such studies. Hence it has come about that for some people and for some purposes varieties and races are more interesting than species, because they throw more light on the workings of the evolutionary mechanism. It does not seem possible to say in advance what complexities of nomenclature are desirable, but naming goes too far when it involves differences which for our purposes are not significant.

It seems simple to say that we will name significant variations from the type which are due to germinal modifications, but will not name those which are the direct result of environmental factors. Thus, on this basis, Mr. Gunder logically rejects various "minor" varieties, which may be supposed to be due, at least frequently, to lack of sufficient food in the larva state. But the difficulty we meet is this, that objectively, upon inspection, it is often impossible to distinguish between the effects of environment and true mutation. Any study of species teaches us that size is very frequently a specific character, and it must also be, in numerous instances, of racial significance. We already know much about chromosome changes in relation to size among plants. But again, Mr. Gunder fully recognizes melanism in his system of named varieties or forms, but has he inspected the remarkable figures of *Vanessa (urticae, io, polychoros and antiopa)* in Schröder's *Handbuch der Entomologie*, Bd. 2, pp. 476-477 (1926)? We are there shown (1) the normal form, (2) the effects of moderate cold, (3) the effects of extreme cold, (4) the effects of warmth, and (5) the variation due to extreme heat. The striking aberrations produced by extremes of heat and cold are practically the same, and are given the same names, viz. *V. urticae* ab. *ichnusoides* Selys., *V. io* ab. *antigone* Fisch., *V. polychloros* ab. *testudo* Esp., *V. antiopa* v. *hygiaea* Hdrch. *V. cardui* ab. *elymi* Rbr. is another modification of the same sort. It is not

therefore to be inferred that melanism is always due to heat or cold, but the point is that we cannot determine the cause on mere inspection of the specimens. We are apparently obliged to record these variations by name—and the records are of value—but to leave it to the future to determine how they are caused. Yet, as experimental evidence accumulates, we are more and more able to make reasonably correct inferences.

There are certain kinds of variation which are worth critical study, but are not covered by Mr. Gunder's rather artificial scheme.

(1.) Any one who inspects a good series of a large genus, such as *Papilio*, can see that there are various progressive tendencies in shape, markings and color which culminate in series of diverse species. Now it should be of interest to seek the beginnings of these changes, or to record the variations of one species which are in the direction of the normal form of a related one. Thus it may well happen that very slight modifications may sometimes be worth noting, when making an evolutionary study of a group.

(2.) There are races which appear nearly alike, and yet certainly, or almost certainly, arose independently. When we suspect independent origin, we may be guided by very small peculiarities, which tell the story. (Collectors of postage stamps know this well!) In practice, it is doubtless best to retain the same name for races appearing identical, but existing in different regions, until it is possible to prove diversity of origin.

From the standpoint of nomenclature, I think the races or subspecies, though expressed by trinomials, should rank with species. That is, the racial name should not be repeated within the genus and the first published name takes precedence, whether published as a species or as a subspecies. The intermediates found where the ranges of subspecies meet are presumably nearly always due to crossing.

The mutation, aberration or form should I think stand in a different category. For various reasons, which I need not discuss, it seems better (1) not to give priority as a specific name, when a named aberration has been found to belong to a species not hitherto separated; and (2) the use of the same term for parallel aberrations within the genus, or in races of one species, should be permitted and encouraged.